17 April 1968

Materiel Test Procedure 2-3-130
General Equipment Test Activity

U.S. ARMY TEST AND EVALUATION COMMAND
COMMODITY SERVICE TEST PROCEDURE

VEHICLES, ADMINISTRATIVE

1. OBJECTIVE

This document sets forth the test methods and techniques necessary for determining to what degree experimental administrative vehicles perform the mission as described in the Qualitative Materiel Requirements (QMR's), Small Development Requirements (SDR's), Military Characteristics (MC's), and the suitability of the administrative vehicles and their maintenance package for use by the Army.

2. BACKGROUND

The U. S. Army continually investigates advances in the automotive industry to insure that they are provided with the most modern, efficient, and reliable vehicles available.

The Army customarily uses administrative vehicles for dispatching, escorting, and general transportation type missions. However, under certain conditions these vehicles may see limited use in field operations. It is, therefore, necessary that the Army, through the application of this MTP, procure the most overall efficient and reliable automotive equipment.

3. REQUIRED EQUIPMENT

a. Tape for measuring (minimum of 20 feet)
b. Clinometer
c. Motion Picture Camera and Film
d. Still Camera and Film
e. Appropriate Loads
f. Road Courses (reference 4C). Paved and Unpaved Roads:

   1) Level road
   2) Hilly road with side slopes and longitudinal slopes

g. Scales for weighing loads, as applicable
h. Safety Helmets

4. REFERENCES

A. MIL-A-45365E, Automobile, Sedans: Executive.
B. MIL-A-45168G, Automobiles, Sedans and Station Wagons.
C. Automotive Test Facilities Development and Proof Services, Aberdeen Proving Ground, Maryland, May 1966, Fourth Edition.
D. USATECOM Regulation 385-7, Safety Confirmation.
E. USATECOM Regulation 705-4, Equipment Performance Report.
F. USATECOM Regulation 700-1, Value Engineering.

G. USATECOM Regulation 750-15, Maintenance of Supplies and Equipment - Maintenance Portion of Service Test.
H. HEL Standard S-6-66, Human Factors Engineering Design Standard for Wheeled Vehicles.
I. HEL Standard S-1-63B, Maximum Noise Level for Army Materiel Command Equipment.
J. AMCR 385-224, AMC Safety Manual.
K. National Fire Code Standard Pamphlet No. 70.
L. MTP 2-3-500, Pre-operational Inspection and Physical Characteristics.
M. MTP 2-3-501, Safety Hazards.
N. MTP 2-3-502, Maintenance.
O. MTP 2-3-505, Road Mobility.
P. MTP 2-3-507, Durability and Reliability.
Q. MTP 2-3-513, Fuel and Oil Consumption.
R. MTP 2-3-516, Human Factors Engineering.
S. MTP 2-3-519, Surface Transportability (Vehicles).
T. MTP 10-3-501, Operator Training and Familiarization.

5. SCOPE

5.1 SUMMARY

This MTP includes the following:

a. Operator Training and Familiarization - A program to insure that the user personnel are familiarized adequately and properly in the performance of their duties and safety aspects of the use of the test items.

b. Initial Inspection - A study to determine the completeness of the test item, its physical characteristics, and that it is in a satisfactory operating condition prior to conducting the test.

c. Operational Performance - An evaluation to determine whether or not service personnel are capable of operating the test item under all possible mission-task conditions.

d. Mission Operations - Operation of the vehicles in actual or realistically simulated missions, performing representative mission tasks of types and duration expected to be encountered in actual Army use to determine suitability for their intended purpose.

e. Surface Transportability - An operation to determine the adaptability of the test item to various modes of Army transportation.

f. Durability and Economy - A study to determine the test item capability to operate for the required period of time for a given number of miles with a minimum of downtime.

g. Human Factors Engineering - An evaluation of the man item relationship stressing ease and simplicity of operation of the test item.

h. Maintenance Evaluation - A study to determine maintainability, reliability and the adequacy of the technical manuscripts and manuals, tools, maintenance package and maintenance provisions of the administrative vehicles.

i. Safety Hazards - An evaluation to determine the adequacy of safety provisions and to confirm safety aspects of the test item.

j. Value Analysis - A study to determine if the test item has any unnecessary features.

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5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Operator Training and Familiarization

a. Perform the applicable portions of MTP 10-2-501 and instruct test personnel in the following areas:

1) Transportability
2) Durability
3) Safety
4) Value Analysis

b. License all operators, as applicable

6.1.2 Initial Inspection

The test item shall be subject to the applicable portions of MTP 2-3-500 and the following procedures:

6.1.2.1 Arrival Inspection

a. Photograph the test item and its major components in their "as received" condition.

b. Record the following for the test item:

1) Nomenclature
2) Model No.
3) Serial No.
4) Manufacturer
5) Special equipment or accessories

c. Record the following for each major component, as applicable:

1) Nomenclature
2) Model No.
3) Serial No.
4) Manufacturer

d. Visually examine the test item and record and photograph the following, as required:

1) Material defects
2) Construction defects
3) Workmanship defects

6.1.2.2 Inventory Check

Conduct an inventory against the Basic Issue Item List (BIIL) and record any discrepancies as regards the maintenance literature, spare parts, associated tools, associated equipment and components. Record all shortages and render an Equipment Performance Report (EPR) when applicable.

6.1.2.3 Physical Characteristics

Determine and record the physical characteristics of the test item as described in the applicable sections of MTP 2-3-500.

6.1.3 Pre-Operational Inspection

Service maintenance personnel shall perform the following checks and inspections, using the tools supplied with the test items and their normal compliment of authorized tools as applicable:

a. Subject the test item to a complete lubrication.
b. Tire pressures shall be checked.
c. Hydraulic and brake fluid levels shall be checked and evidence of leakage recorded.
d. Verify operability of controls and instruments.

NOTE: This includes operation of parking brakes, brakes, steering accelerometer, odometer, gearshift, etc., as applicable.

e. Verify operation of accessory equipment, i.e., heater, air conditioner, as directed in the applicable manual.

6.2 TEST CONDUCT

The following tests shall be conducted in conjunction with one another wherever possible.

NOTE: The personnel performing the test should attempt to conduct the test procedures in environmental and terrain conditions approximating the specified conditions as closely as possible.

6.2.1 Operational Performance

Determine the ability of the test item to be operated over different types of terrain under various environmental conditions, to accelerate, decelerate, and maneuver as follows:

NOTE: The test item's daily log shall contain a record of all terrain conditions (mud, snow, sand, etc.) and environmental conditions (rain, wind driven rain, sleet, etc.)

6.2.1.1 Mobility Tests

Determine the ability of the test item to be driven over roads as described in the applicable sections of MTP 2-3-505 and the following by service personnel:

NOTE: Tests shall be conducted under as many environmental conditions as is practicable and safe with emphasis on clear, warm weather; rain; and winds between 20 and 30 mph.

a. Drive the test item, without a load, over a paved road course including enough natural turns and hills which will prevent the test item from going in a straight line, and determine and record the ability of the service personnel to perform the following:

1) Maintain a reasonable safe speed for a distance of 25 miles
2) Operate the vehicle in reverse for a distance of 25 yards

b. Record the following:

1) Weather conditions
2) Speeds attained
3) Difficulties encountered while:

a) Driving straight
b) Turning
c) Avoiding obstacles, when applicable

c. Photograph any difficulties encountered with a still or motion picture camera, as applicable.

d. Repeat steps a through c over a course consisting of secondary roads (See Appendix A) which include enough natural turns and hills which will prevent the test item from going in a straight line.

e. Determine and record the ability of the service personnel to perform the following:

1) Traverse side slopes of approximately 30%
2) Traverse longitudinal slopes of approximately 45%
3) Stop, hold and start the test item when:

a) Ascending and descending a longitudinal slope a minimum of 30%.
b) Ascending and descending a side slope a minimum of 20%,

f. Repeat steps a through d with the test item carrying a load of two passengers.

g. Repeat steps a through d with the test item carrying its maximum rated load in terms of passengers.

h. Repeat steps a through f after dark.

i. Record the total mileage accumulated.

6.2.1.2 Subsystems Evaluation

Record the following for each subsystem evaluation:

a. Weather data (temperature, humidity, precipitation, etc.)
b. Difficult handling conditions
c. Problems encountered

6.2.1.2.1 Starting Evaluation - Determine and record the starting capability of the engine, when starting the engine under the following conditions:

a. Hot engine
b. Cold engine
c. Humid weather
d. Temperatures below 32°F
e. Rain and wind driven rain

6.2.1.2.2 Transmission and Clutch Operation Evaluation - Determine and record the adequacy of the power transmission and clutch assemblies, as applicable, as observed during the mobility tests of paragraph 6.2.1.1.

6.2.1.2.3 Suspension System Evaluation - Determine and record the adequacy and any shortcomings of the suspension system as observed during the performance of the mobility tests of paragraph 6.2.1.1.

6.2.1.2.4 Braking System Evaluation - Record the adequacy of the braking system as determined during the mobility tests of paragraph 6.2.1.1 and the following:

a. Perform the following on dry and wet paved roads

1) A minimum of 3 emergency stops at:

a) 30% maximum safe highway speed
b) 60% maximum safe highway speed
c) Maximum safe highway speed

2) Repeated brake operation at 30% maximum speed

b. Record the following:

1) The ability of the test item to stop in a straight line.
2) Amount of brake fading observed (negligible, considerable, excessive).
3) Any shortcomings observed such as excessive pedal pressure, uneven stopping, brake "chatter", locking, etc.
4) Vehicle speed.

c. Repeat steps a and b on an unpaved road, reducing speeds as applicable.

d. Determine and record the maximum slope upon which the parking brakes will hold the test item at rest.

6.2.1.2.5 Steering Evaluation

a. Determine and record any shortcomings or discrepancies in the steering system as observed during conduct of the mobility tests of paragraph 6.2.1.1.

b. Determine and record the left and right turning radii.

6.2.1.2.6 Electrical Equipment Evaluation

a. Determine and record the adequacy of the headlights to function properly and the distance at which they are visible while traversing the test courses described in paragraph 6.2.1.1 under conditions of:

1) Daylight with:

a) Fog
b) Heavy rain
c) Snow

2) Darkness
3) Darkness with:

a) Fog
b) Heavy rain
c) Snow

b. From the above data determine and record the maximum safe vehicle speed as a function of night, fog, rain and snow visibility.

c. Determine and record the following:

1) The visibility distance and adequacy of tail lights, stop lights, turn signals, and back-up lights, as applicable.
2) The adequacy of the horn to function as a warning device and distance at which it is audible.
3) The adequacy of the heater, wipers, console lights, etc.

NOTE: The above items shall be evaluated and re-evaluated throughout the testing procedures. Data shall be recorded as appropriate.

6.2.2 Mission Operations

a. Operate the vehicle in realistic service environments and perform tasks within the mission of various TOE units (i.e., Military Police, Headquarters units, Mail units, etc.) as directed in the test plan.

NOTE: 1. Operators and maintenance personnel organic to the using or support units will be used. Typical sites and routes will be selected to include various installation and off-road (when applicable) itineraries.
2. Sedans and station wagons shall be subjected to operation

over smooth, hard-surfaced roads and secondary roads. Cross country operation is not required of sedans and station wagons. Utility and pickup trucks up to one-half ton capacity shall be operated over all types of paved and secondary roads as well as open, rolling and hilly terrain while carrying rated payloads.

3. Only allocated servicing or maintenance shall be performed.
4. Tests shall be conducted during all weather and under night conditions insofar as safety procedures permit.

b. Record the following:

1) Mission performed
2) Distance travelled
3) Time expended
4) Types of terrain travelled
5) Weather conditions and their durations
6) Number of daylight and darkness hours
7) Compatability of vehicle with passengers and/or cargo
8) Capability of vehicle to perform its assigned mission
9) Down time
10) Failures or delays

c. If applicable, operate the vehicle in appropriate field exercises and in convoys with other military vehicles. Determine and record the degree to which the items conform to highway and convoy regulations.

d. If applicable, install any kits provided with the vehicle.

e. Perform fording operations as determined by the capability of the vehicle.

f. Record the following:

1) Adequacy of kits with respect to installation and performance
2) Fording capability

6.2.3 Surface Transportability

a. Determine surface transportability of the test item as described in the applicable sections of MTP 2-3-519.

b. Ensure proper functioning by repeating the procedures of paragraph 6.1.3.

6.2.4 Durability and Economy

Determine the durability and economy of the test item as described in the applicable sections of MTP 2-3-507, and the following:

a. Operate the test item over the road courses described in paragraph 6.2.1.1, emphasising operations under conditions of humidity, rain, and dust, until an over-all mileage of at least 5000 miles is attained and record the following throughout testing:

1) Environmental conditions.

2) Speeds attained.
3) Road conditions.
4) Maintenance man-hours, both scheduled and unscheduled.
5) Damage to test item or components.
6) Malfunctions of equipment.
7) Fuel and oil consumption data collected as described in the applicable sections of MTP 2-3-513.
8) Various types of fuels and oils used and results.
9) Total mileage.
10) Operating time.

6.2.5 Human Factors Engineering

Determine the effectiveness of the man-item relationship during use of the test item by performing the applicable portions of MTP 2-3-516, Human Engineering Laboratories, (HEL) Standard S-6-66, and the following:

a. Record mechanics ability to see service or adjustment points.

b. Record the octave Band Noise Analysis in all operator, passenger and maintenance spaces in accordance with provisions of HEL Standard S-1-63B.

c. Interview operators following completion of mission related tasks. Unfavorable opinions shall be explained and supported by additional solicited comments:

d. Record the following:

1) Adequacy of operating controls
2) Operational comfort
3) Ease of operation
4) Adequacy of operator's and passenger space
5) Physical effort required for operations
6) Simplicity of servicing and maintenance of the test item
7) Effects of engine fumes
8) Opinions of operators

6.2.6 Maintenance Evaluation

Determine the maintainability of the test item as described in the applicable sections of MTP 2-3-502 and perform the following in accordance with the criteria of USATECOM Regulation 750-15:

a. Perform all scheduled maintenance as directed in the test item's draft technical manual.

b. Perform all unscheduled maintenance as required during the operation of the test item.

c. Prepare an Equipment Performance Report for all malfunctions discovered during maintenance operations.

NOTE: Tools and equipment required for maintenance shall be part of the maintenance package or indigenous to the level of maintenance.

d. Record the following for steps a and b:

1) Type and serial number of test item(s).
2) For all maintenance personnel:

a) Rank
b) MOS number
c) Experience in MOS
d) Training in MOS

3) Date and time test item is turned in for maintenance
4) Total operating time of test item
5) Equipment Performance Report number (if applicable)
6) Maintenance level information:

a) Recommended level.
b) Group number of maintenance function at MAC maintenance level.

7) Ease of maintenance operation
8) Time required for maintenance
9) Time summary of maintenance actions
10) Category of maintenance actions
11) Tools or equipment required
12) Nomenclature and FSN of parts required or replaced
13) Adequacy of maintenance instructions

6.2.7 Safety Hazards

Evaluate the safety hazards of the test item as described in the applicable section of MTP 2-3-501 and by performing the following:

a. Observe the adequacy of prescribed safety precautions throughout the testing procedures and make appropriate suggestions to improve these precautions.

b. Inspect test item and observe for hazards to personnel or property resulting from inherent design features and/or from use within unit mission-type operations.

NOTE: Hazards will be reported to testing officials immediately

c. If required, determine whether test item meets the explosion-proof requirements.

NOTE: If the test item is to be used in an area defined as a hazardous location in the National Electrical Code, the test item must comply with the explosion-proof requirements of paragraphs 601c, 603e, and 1202b of AMCR 385-224 and National Fire Code Standard Pamphlet No. 70. In general, a hazardous area, as defined in the National Electrical Code and in paragraph 603e of AMCR 385-224,

is one in which flammable gases or vapors, combustible dust, or ignitable fibers or flyings are present in the air in quantities sufficient to produce explosive or ignitable mixtures.

d. If test item is operated in a hazardous location ensure compliance with the special personnel and equipment protective guarding and operation requirements of Section 24, AMCR 385-224.

e. Record the following:

1) Adequacy of prescribed safety precautions.
2) Hazards to personnel or property resulting from design features, etc.
3) If applicable, are explosion-proof requirements met.
4) If applicable, are special personnel and equipment protective guarding and operation requirements met.

6.2.8 Value Analysis

Value analysis of the test item is made to determine whether the (item) has any nonfunctional, costly, or "nice-to-have: features as stated in USATECOM Regulation 700-1.

a. During operation and maintenance of the (item), observations will be made to determine whether the (item) incorporates any features that could be eliminated without compromising their performance, reliability, durability, or safety.

b. During the conduct of the test, the users will be informally questioned regarding any feature of the (item) that may be eliminated without decreasing the functional value of (item). All user comments regarding value analysis will be recorded in the daily log.

c. The test team members will study the (item) during use and will comment separately in the daily log on elimination of unnecessary features, using their experience and background with respect to value analysis.

6.3 TEST DATA

6.3.1 Preparation For Test

6.3.1.1 Operator Training and Familiarization

Record data collected as described by the applicable sections of MTP 10-3-501.

6.3.1.2 Initial Inspection

a. Data shall be collected and recorded as described in MTP 2-3-500

6.3.1.2.1 Arrival Inspection

a. Record the following:

1) For each test item:

a) Nomenclature
b) Model No.
c) Serial No.
d) Manufacturer
e) Special equipment or accessories

2) For each major component, as applicable:

a) Nomenclature
b) Model No.
c) Serial No.
d) Manufacturer

3) Presence and location of, when applicable:

a) Material defects
b) Construction defects
c) Workmanship defects

b. Retain the following:

1) Photographs of the test item and its major components in their "as received condition".
2) Photographs of defects.

6.3.1.2.2 Inventory Check

Record all shortages

6.3.1.2.3 Physical Characteristics

Record data collected as described in the applicable sections of MTP 2-3-500.

6.3.1.3 Pre-Operational Inspection

Record any adjustments required

6.3.2 Test Conduct

6.3.2.1 Operational Performance

6.3.2.1.1 Mobility Tests

a. Record the following:

1) Data collected as described in the applicable sections of MTP 2-3-505.
2) Ability of service personnel to:

a) Maintain a reasonable safe speed for 25 miles
b) Operate the vehicle in reverse for 25 yards

3) Weather conditions (temperature, precipitation, wind, etc.).
4) Road conditions (paved, unpaved).
5) Load conditions (2 passengers, maximum rated passenger load).
6) Light conditions (daylight, darkness).
7) Speeds attained, in mph.
8) Difficulties encountered while:

a) Driving straight
b) Turning
c) Avoiding obstacles, when applicable

9) Ability of service personnel to:

a) Traverse 30% side slopes
b) Traverse 45% longitudinal slopes
c) Stop, hold and start the test item when:

(1) Ascending and descending a longitudinal slope a minimum of 30%.
(2) Ascending and descending a side slope a minimum of 20%.

10) Total mileage accumulated.

6.3.2.1.2 Subsystem Evaluation

a. Starting Evaluation

1) Record the following:

a) Weather data (temperature, humidity, precipitation, etc.)
b) Difficult handling conditions
c) Problems encountered

2) Record the starting capability under the following conditions:

a) Hot engine
b) Cold engine
c) Humid weather
d) Rain and wind driven rain
e) Ambient temperature below 32°F

b. Transmission and Clutch Operation Evaluation - record the adequacy of the power transmission and clutch assemblies, as applicable, as observed during the mobility tests and the following:

1) Weather data (temperature, humidity, precipitation, etc.)

2) Difficult handling conditions
3) Problems encountered

c. Suspension System Evaluation - record the adequacy and any shortcomings of the suspension system and the following:

1) Weather data (temperature, humidity, precipitation, etc.)
2) Difficult handling conditions
3) Problems encountered

d. Braking System Evaluation - record the following:

1) The adequacy of the braking systems as observed from paragraph 6.2.1.1.
2) The ability of the test item to stop in a straight line.
3) Amount of brake fading (negligible, considerable, excessive).
4) Shortcomings, i.e., excessive pedal pressure, locking, etc.
5) Road conditions (dry or wet, paved or unpaved).
6) Vehicle speed.
7) Maximum slope upon which the parking brakes will hold the test item.

e. Steering Evaluation - record the following:

1) Weather data (temperature, humidity, precipitation, etc.)
2) Difficult handling conditions
3) Problems encountered
4) Any shortcomings of the steering system
5) Left and right turning radii

f. Electrical Equipment Evaluation

1) Record the adequacy of the headlights and distance at which they are visible under conditions of:

a) Daylight with:

(1) Fog
(2) Heavy rain
(3) Snow

b) Darkness
c) Darkness with:

(1) Fog
(2) Heavy rain
(3) Snow

2) Record the following:

a) Maximum safe vehicle speed as a function of night, fog,

rain, and snow visibility.
b) Adequacy and visibility distance of taillights, stop lights, turn signals and back-up lights, as applicable.
c) Adequacy of horn as a warning device and distance at which it is audible.
d) Adequacy of heater, wipers, console lights, etc.

6.3.2.2 Mission Operations

Record the following:

a. Mission performed.
b. Distance travelled.
c. Time expended.
d. Types of terrain.
e. Weather conditions and their durations.
f. Number of daylight and darkness hours.
g. Compatability of vehicle with passengers and/or cargo.
h. Capability of vehicle to perform its assigned mission.
i. Downtime, in hours.
j. Failures or delays.
k. Degree to which the item conforms to highway and convoy regulations.
l. Adequacy of kits with respect to installations and performance.
m. Fording capability.

6.3.2.3 Surface Transportability

Record the following:

a. Data collected as described in the applicable sections of MTP 2-3-519.
b. Data collected as described in paragraph 6.1.3

6.3.2.4 Durability and Ecomony

Record the following:

a. Data collected as described in the applicable sections of MTP 2-3-507.
b. Environmental conditions (humid, rain, dust).
c. Speeds attained, in mph.
d. Road conditions, (paved, unpaved).
e. Maintenance man-hours.

1) Scheduled
2) Unscheduled

f. Damage to test item or components.
g. Malfunctions of equipment.
h. Data collected as described in the applicable sections of MTP 2-3-513.

i. Various types fuels and oils used.
j. Total mileage.
k. Operating time, in hours.

6.3.2.5 Human Factors Engineering

Record the following:

a. Data collected as described in the applicable sections of MTP 2-3-516.
b. Data collected as described in HEL Standard S-6-66.
c. Mechanics ability to see service or adjustment points.
d. Octave band noise analysis results.
e. Adequacy of operating controls.
f. Operational comfort.
g. Ease of operation.
h. Adequacy of operators and passenger space.
i. Physical effort required for operations.
j. Simplicity of servicing and maintenance of the test item.
k. Effects of engine fumes.
l. Opinions of operators.

6.3.2.6 Maintenance Evaluation

Record the following:

a. Data collected as described in the applicable sections of MTP 2-3-502.
b. Type and serial number of test item(s).
c. For all maintenance personnel:

    1) Rank
    2) MOS number
    3) Experience in MOS, in months
    4) Training in MOS, in months

d. Date and time test item is turned in for maintenance.
e. Total operating time of test item, in hours.
f. Equipment performance report number, if applicable.
g. Maintenance level information

    1) Recommended level
    2) Group number of maintenance function at MAC maintenance level.

h. Ease of maintenance operation.
i. Time required for maintenance, in hours.
j. Time summary of maintenance action.
k. Category of maintenance action.
l. Tools or equipment required.
m. Nomenclature and FSN of parts required or replaced.
n. Adequacy of maintenance instructions.

6.3.2.7 Safety Hazards

Record the following:

a. Data collected as described in the applicable sections of MTP 2-3-501.
b. Suggestions to improve existing safety precautions.
c. Hazards to personnel and property resulting from inherent design features and/or use within mission type operations.
d. If applicable, whether test item meets the explosion-proof requirements.
e. If applicable, whether special personnel and equipment protective guarding and operation requirements are met.

6.3.2.8 Value Analysis

Record the following:

a. Nonfunctional features
b. Costly features
c. Nice-to-have features
d. Operator's comments

6.4 DATA REDUCTION AND PRESENTATION

All data will be summarized to reveal significant deficiencies of the tests performed on the experimental motorcycles and scooters. Photographs, charts, and personnel observations pertaining to the adequacy of the test items will be used.

Deficiencies and shortcomings, with recommendations for corrective actions, will be furnished by EPR.

The findings are reviewed and an analysis is made in terms of their impact or effect on the suitability of the experimental motorcycles and scooters for use under service conditions - compatibility, durability, reliability, functional and operational performance.

Presentation will be in the form of charts, graphs, and narrative as applicable or as indicated in an applicable MTP used in this procedure, and will indicate the effects of the various weather and road conditions.

APPENDIX A

DESCRIPTION OF ROAD COURSES

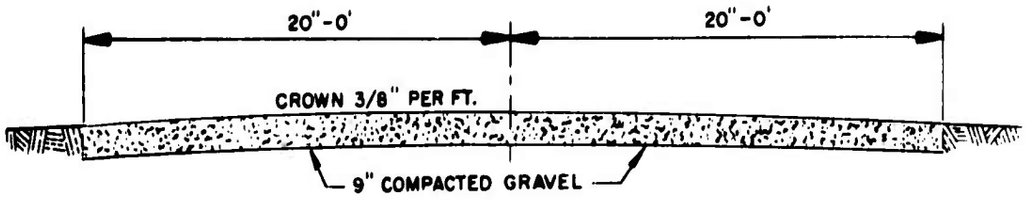
The courses listed below have been taken from reference 4C. These courses are typical of roads which will satisfy the requirements of the administrative vehicle mobility tests of paragraph 6.2.1.1.

SECONDAR. ROAD

1. Munson: The Improved Gravel Road (page 6 of reference 4C) depicted in Figure A-1 is the applicable road. This road is a loop of approximately two miles having left and right curves. The surface is compacted gravel which is maintained by grading.

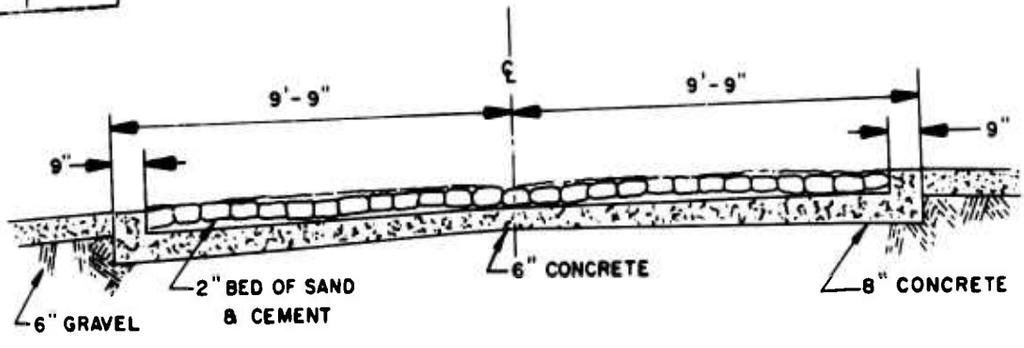
2. Perryman: The Perryman Area secondary roads are narrow, with sharp sweeping turns typical of unimproved country roads. These roads, which are approximately 3.5 miles long, are maintained by grading and filling with crushed stone as necessary.

3. Belgian Block: The Belgian Block Course (page 14 of reference 4C) depicted in Figure A-2, is paved with unevenly laid granite blocks forming an undulating surface. It duplicates a rough cobblestone road such as is found in many parts of the world. Approximately three-quarters of a mile in length, the course is used as a standard rough road for wheeled vehicles.



LENGTH OF COURSE, 10,946 FT.

FIGURE A-1 CROSS SECTION OF GRAVEL ROAD



LENGTH OF COURSE 3,936 FT

FIGURE A-2 TRANSVERSE SECTION, BELGIAN BLOCK COURSE